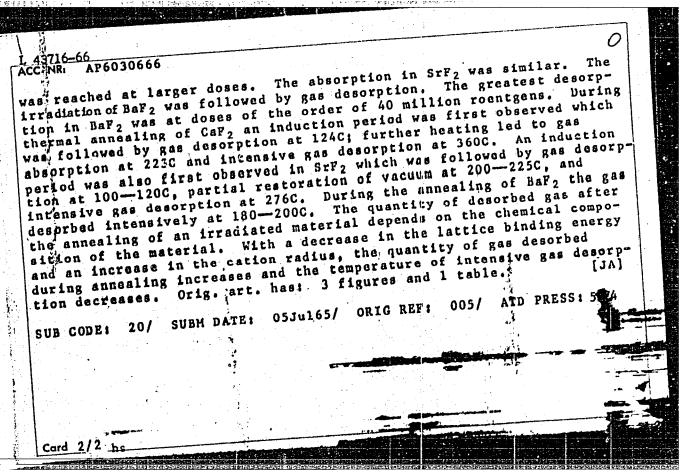
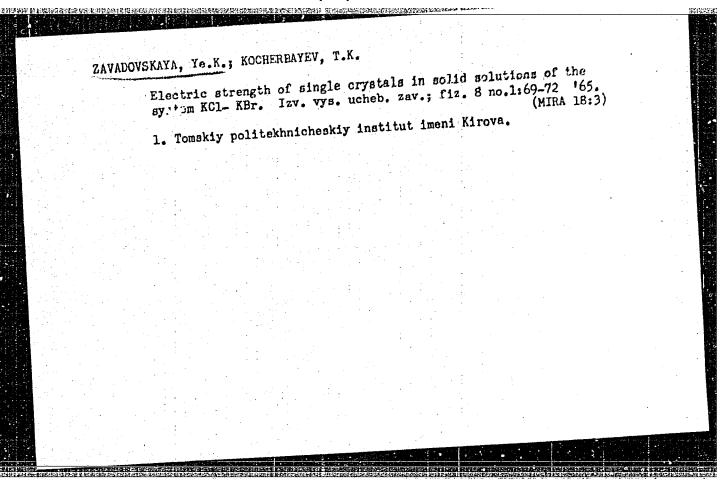
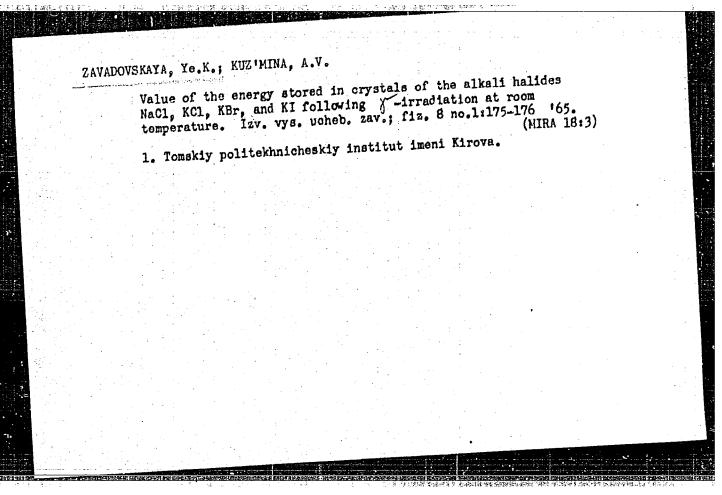
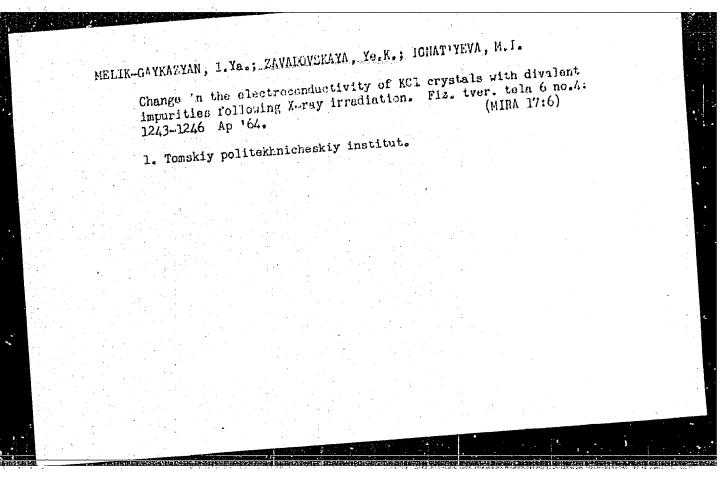
SOURCE CODE: UR/0166/66/000/004/0046/0049 L 43716-66 EWT(m)/EWP(t)/ETI ACC NRI AP6030666 Zavadovskaya, Ye. K.; Blaunshteyn, I. M.; Timoshenko, I. M. Tomsk Polytechnic Institute (Tomskiy politakhnicheskiy institut) AUTHORI TITLE: On radiation resistance by fluorides of alkali earth metals 27 Izvestiya. Seriya fiziko-matematichoskikh nauk, SOURCE: AN UZSSR. no. 4, 1966, 46-49 TOPIC TAGS: radiation effect, radiation damage, gcs absorption, descrition, gas adsorption, ALKALI METAL, GAMMA LAY ABSORPTION ABSTRACT: An investigation was made of the energy absorbed and stored by CaF2, SrF2, and BaF2 1rradiated with gamma-rays. 19 The absorbed energy can be spent on luminescence and radiolysis due to irradiation. Considerably less energy was stored in BaF2 than in CaF2 (the material with the higher lattice energy). Since at equal radiation doses the amount of energy stored in CaF2 is greater than in BaF2, it can be assumed that the former spends less energy on radiolysis and, consequeptly, accumulates fewer radiolysis products. The process of radiolysix was investigated on the basis of the absorption and desorption of gass during irradiation and annealing. The most intensive absorption of gas by Car 2 occurred at doses up to 20 million roeptgens; saturation Card 1/2



	Measurement of the energy stored in LiF orystals following ionizing i-radiation at room temperature. Fiz. tver. tela 6 no.11:3348-3350 (MIRA 18:1)							
	1. Tomskiy politekhnicheskiy institut.							
	19 Tonon-A .							
•								
e de la companya de l								







5/0181/64/006/004/1243/1246 ACCESSION NR: AP4028465 AUTHORS: "Melik-Caykazyan, I. Ya.; Zavadovskaya, Ye. K.; Ignatiyeva, M. I. TITLE: Change in electrical conductivity of KCl crystals on addition of bivalent impurities after x-ray irradiation SOURCE: Fizika tverdogo tela, v. 6, no. 4, 1964, 1243-1246 TOPIC TAGS: conductivity, electrical conductivity, KCl, KCl crystal, x-ray, F centor, Pb doped KCl, Sr doped KCl, F centor density, impurity, impurity concentration, current carrier, hole center ABSTRACT: The authors have studied the ionic conductivity, its radiation change during equal doses of x-irradiation (~4.104 roentgens) in KCl-Pb and KCl-Sr crystals, and the density of F centers in KCl-Sr. Pb and Sr impurities have altogether different acceptor properties relative to holes. Pb2+ in NaCl is an acceptor of electrons, but Sr2+ in KCl gives rise to activator hole centers. In KCl a comparatively small increase in electrical conductivity accompanying the injection of Sr up to 2.10-2 molecular percent corresponds to an increase in F CardL/2

ACCESSION NR: AP4028465

centers of 210%. The maximum increase in density of F centers in KCl activated by Pb does not exceed 70%. Changes in conductivity with changes in impurity concentration indicate that the first are observed only in the interval of concentration for which a change in conductivity in nonirradiated crystals takes place. Conductivity in a crystal affects radiation change only at those impurities situated in regular points of the crystal lattice. Increased radiation changes in the conductivity of KCl-Pb are observed, first, through decrease in number of current carriers arising during localization of holes at single ion vacancies and, second, because of increased stability of hole centers that have formed through the appearance of electron atomic centers. Crig. art. has: 2 figures.

ASSOCIATION: Tomskiy politekhnicheskiy institut (Tomsk Polytechnical Institute)

SUBMITTED: 29Jul63

DATE ACQ: 27Apr64

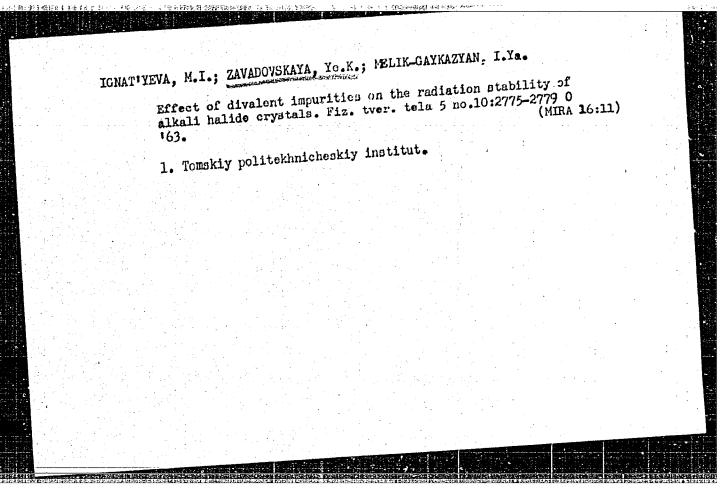
ENCL: 00

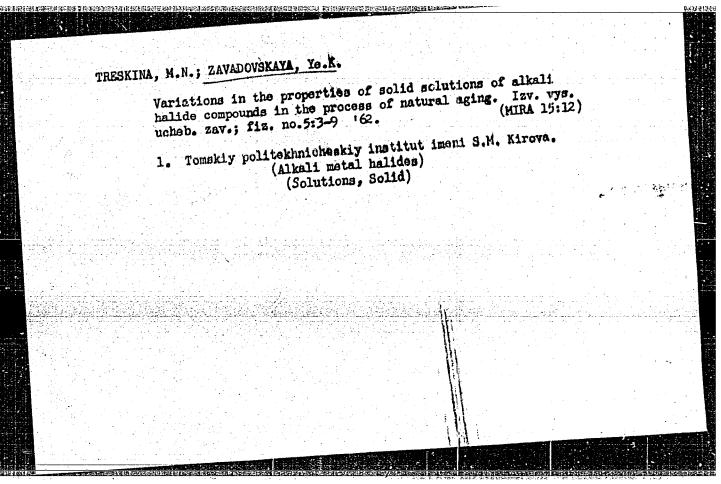
SUB CODE: PH

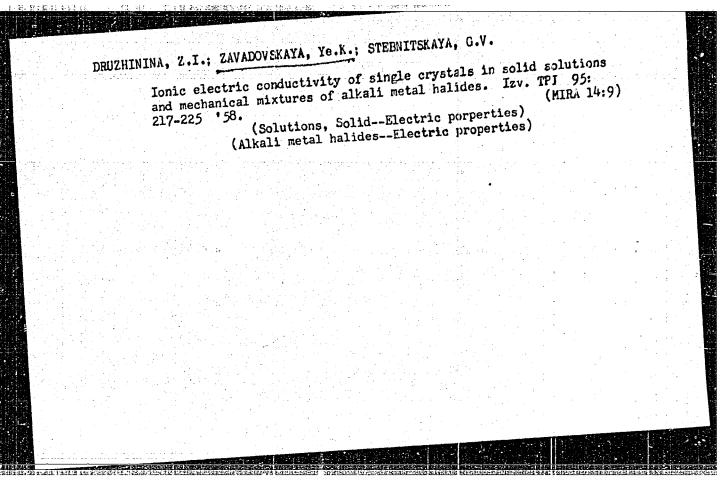
NO REF SOV: OOL

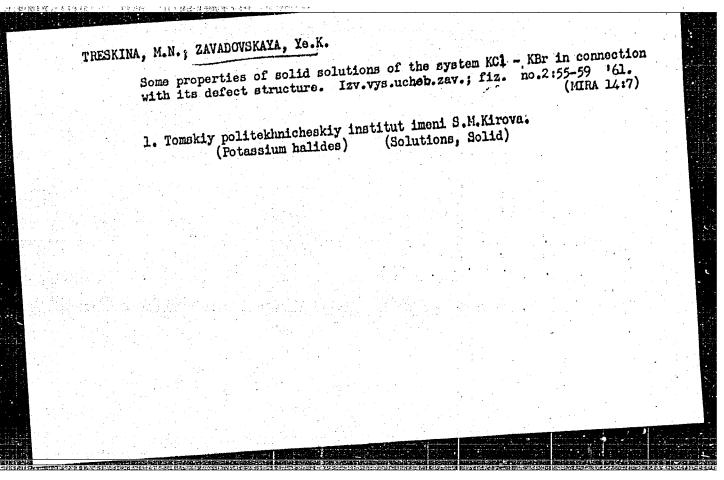
OTHER: OC

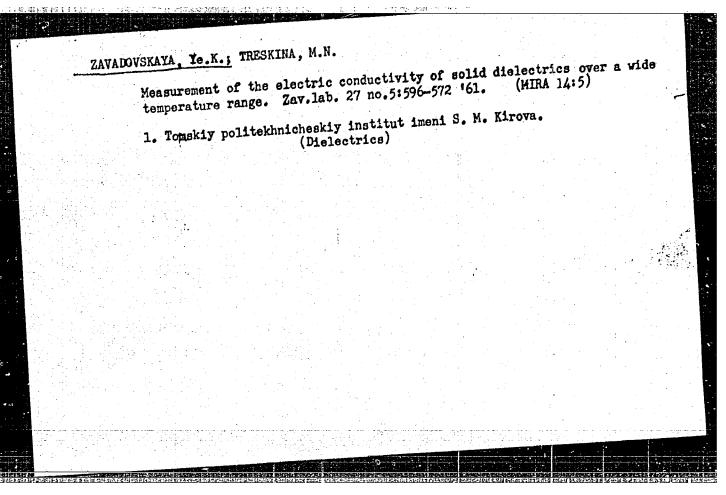
Card2/2











s/058/61/000/007/024/086 A001/1.101

AUTHORS:

Melik-Gaykazyan, I.Ya., Treskina, M.N., Zavadovskaya, Ye.K.

TITLE:

Dependence of F-center density and half-width of F-band on the domposition of KCl-KBr mixed crystals

PERIODICAL:

Referativnyy zhurnel, Fizika, no. 7, 1961, 140, abstract 7V304 ("Dokl. Mezhvuz, nauchn, konferentsii po spektroskopii i spektr.

analizu". Tomsk, Tomskiy-un-t, 1960, 119 - 121)

The authors investigated the F-band of absorption in KCl-K3r mixed crystals of variable composition grown from the smelt and from the solution, Maximum deviations of the half-width of the P-band from the additive value is observed in the compound consisting of 80 mol. per cent KBr in KCl. The largest concentration of Schottky defects corresponds to the same composition; this apparently explained the deviation of the half-width of the P-band from the additive value. Concentration of F-centers in KCl-KBr crystals is lower than in pure crystals of KCl and KBr. It is possible that the lesser stability of F-centers in solid solutions is caused by asymmetry of surroundings of the color

Card 1/2

CIA-RDP86-00513R001963920016-4" **APPROVED FOR RELEASE: 03/15/2001**

Dependence of F-center density ...

\$\\\058\\61\\\000\\007\\024\\086 A001\\A101

center and increased density of dislocations in the mixed crystal. An inverse dependence of F-center stability on thermal luminescence and density of F-centers is established.

E. Nagayev

[Abstracter's note: Complete translation]

Card 2/2

9,4300 (1145,1147,1155)

S/063/60/005/005/012/021 A051/A029

AUTHORS: Vorob'yev, A.A., Professor, Zavadovskaya, Ye.K., Professor, Boldyrev, V.V., Candidate of Chemical Sciences, Melik-Gaykazyan, I.Ya., Candidate of Physical and Mathematical Sciences, Bayintsev, P.A., Candidate of Physical and Mathematical Sciences

TITLE: Physico-Chemical Problems of Dielectrics

PERIODICAL: Zhurnal Vsesoyuznogo Khimicheskogo Obshchestva im. D.I. Mendeleyeva, 1960, No. 5, Vol. 5, pp. 573-582

TEXT: Dielectrical materials should have a high thermal, chemical and radiation resistance, a high mechanical and electrical strength, in some cases they should have a low value of the angle of losses, a low electroconductivity and a high dielectrical constant (Ref. 1). Some of the more recent ity and a high dielectrical constant (Ref. 1). Some of the dielectrics with fields of application are scintillation counters, where the dielectrics with a large width of the forbidden zone of energy are used, or in explosives a large width of the electronic and ionic processes which occasionally take (Ref. 2), where the electronic and ionic processes which occasionally take

Oard 1/25

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001963920016-4"

X

8/063/60/005/005/012/021 A051/A029

Physico-Chemical Problems of Dielectrics

place in the dielectrics are applied. In outlining the physico-chemical properties of dielectrics, the connection between these properties are discussed in reference to the energy of the lattice. It is pointed out that, since little is known of the physical processes in dielectrics when acted upon by an electrical field, chemistry and the science of electrical materials is mostly empirical. The physical properties of dielectrics in relation to their chemical composition and structure were studied. The dielectrical properties of simple substances with a known chemical composition were investigated (Ref. 1, 4-24). It was found that the main properties of the dielectrics (thermal resistance, binding energy of the electron in the lattice, mechanical strength, optical properties, etc.), were directly determined by the strength and nature of the particle bond in the lattice. Under the effect of external conditions the interaction energy between these particles can be overcome and the lattice destroyed. A number of graphs are presented indicating how the various properties are affected by the lattice energy, i. e., the energy value necessary to divide the crystal lattice, consisting of ions, to individual ions and separation of these from one another to an infinitely large distance at a temperature of absolute zero. The case of binary ionic compounds of the AmBn type, as described by Kapustinskiy (Ref. 25), Card 2/17

\$/063/60/005/005/012/021 A051/A029

Physico-Chemical Problems of Dielectrics

is given where the calculation of the energy of the lattices with a coordination number 6, is estimated according to formula (1): U = 256.1

 $(a+b)W_A \cdot W_B$ where a is the number of cations, b the number of anions, W_A and W_B the valencies of the anion and the cation, R_A and R_B the radii of the corresponding ions for the structure of a lattice of the sodium chloride type. A later version of the formula, where also the repulsion, as well as the attraction of the ions is considered, is given as:

 $U = 287.2 \frac{W_A \cdot W_B(a+b)}{R_A + R_B} \left(1 - \frac{0.345}{R_A + R_B}\right) \quad (2). \quad \text{The ionic crystals have a high}$

value of lattice energy and thus also a high value of thermal and mechanical strength. In the case of isodesmic ionic lattices of the same structural type, the properties of the materials are connected with the energy of the crystal lattice determined by the chemical composition. Fig. 1 is a graphical representation of the effect of the hardness according to Moos, melting representation of the effect of the hardness according to moos, melting representation of the ionic crystals by the lattice energy, Fig. 2 point, electrical strength of the ionic crystals by the lattice energy, Fig. 2 shows the same relationship for alkali earth metal oxides. From equation 1 shows the same relationship for alkali earth metal oxides, which make up it is seen that with a decrease in the size of the particles, which make up

S/063/60/005/005/012/021 A051/A029

Physico-Chemical Problems of Dielectrics

the lattice, the lattice energy increases. Fig. 3 represents the relationship between the change in volume of an elementary nucleus of a molecule (Ref. 3) between the change in volume of an elementary nucleus of a molecule (Ref. 3) in various compounds according to data from X-ray analyses, and the lattice energy for crystals of alkali-halide compounds. Fig. 4 gives the relationship of the number of ions n in one cm to the lattice energy for crystals of alkali-halide salts. The value of n was determined from:

n = $\frac{\text{N.d}}{2(A_4 + A_2)}$ (3), where N is = 6.06 10²³, d the specific gravity, A₁ and A₂

atomic weights of the ions. The specific thermal capacity c, at a constant pressure, is given in Fig.5 in relation to the lattice energy, and Fig.6 shows the relationship of the melting heat to the lattice energy. Experiments showed that the optical properties of ionic crystals also depend on the lattice energy. With an increase in the latter, the absorption of light changes in the infrared, visible and ultraviolet regions according to certain rules. The electronic polarizability in relation to the lattice energy for alkaline halides is shown in Fig.8 (Ref. 30,31). A decrease or an increase of the dielectrical constant and of its components will be noted due to the shift in the ions corresponding to the change in the ion polarizability of the ions and their concentration with a change in the lattice energy. Fig.9 reprecard 4/18

20623 \$/063/60/005/005/012/021 A051/A029

Physico-Chemical Problems of Dielectrics

Card 5/17

sents the change in the electronic component of the dielectrical constant with a change in the lattice energy for crystals of the alkali-halide compound series. The relationship of the electroconductivity to the temperature of ionic crystals is described by the formula:

where u is the activation energy of the liberation processes of the ions in the lattice. Experimental data showed that a significant increase of the high-temperature range of the activation energy significant increase in the lattice energy of the alkali-halide salt takes place with an increase in the lattice energy of the alkali-halide salt crystals. The sum of the activation energies at low and high temperatures crystals. The sum of the activation energies at low and high temperatures crystals. The sum of the activation energies at low and high temperatures crystals out to depend on the lattice energy. The conclusion is drawn here was found to depend on the crystals is connected with the energy of that the electroconductivity of the crystals is connected with the energy of the crystal lattice in a law sequence. Other properties, such as the effective mass of the electron and the magnitude of the oscillating quantum, are ive mass of the electron and the magnitude of the oscillating quantum, are also thought to depend on the lattice energy. It is pointed out here that also thought to depend on the lattice energy. It is pointed out here that these relationships must be accurately established. The electrical strength these relationships must be accurately established. The electrical strength of the dielectric is thought to increase with an increase in the lattice of the energy (Fig. 10). Other properties, such as the thermal resistance of the

S/063/60/005/005/012/021 A051/A029

Physico-Chemical Problems of Dielectrics

and the second secon

ionic crystals are in a reverse relationship to the lattice energy, but this phenomenon is assumed to be illusionary, since the decomposition of these substances is also determined by the ionization potential, as well as the lattice energy. The reverse relationship is also observed in the case of the heterodesmic structures. Data obtained from Refs. 9,10 on a comparison of the physico-chemical properties of liquid and gaseous organic dielectrics with their electrical strength in the aliphatic hydrocarbon series showed that the electrical strength changes sympatically with the change in the intermolecular bond strength and does not depend on the bond strength within the molecule. These results were used to form a graph of the spark-over of the organic dielectrics (Fig. 11). Further mention is made of the connection between the physico-chemical properties of dielectrics and the lattice energy when the structure is destroyed. The contraversial facts noted in real crystals, viz., the mechanical properties of these single crystals changing according to certain rules with the change in the lattice energy, are explained by the behavior of the defects, especially of dislocations, i.e., by the energy of the crystal lattice. One of the possible means for obtaining a controllable concentration of the defects in the lattice is the formation of solid solutions. Upon investigating the electrical properties of the solid Card 6/14

20623 8/063/60/005/005/012/021 A051/A029

Physico-Chemical Problems of Dielectrics

solutions CaO-ZrO2, a defect in their structure was noted (Ref. 47). A complex investigation of the physical properties of the solid solutions KC1-RbC1, KC1-KBr, NaC1-NaBr was carried out. It was proven that the general characteristic, which determines the physical properties of a complex dielectric, was the heat of formation. It is expected that a drop in the interaction forces would involve a drop in the strength and an increase in the defect of the solid solution. The relationship between the heat of formation of the solid solution and the average number of particles n included in the volume of the elementary nucleus (for an ideal single crystal n = 8) leads to the conclusion that the more heat absorbed in the formation of the solid solution, i.e., the lower the energy of interaction of the particles in the crystal lattice of the crystal, the more defective is its structure. The connection between the defectiveness of the structure and the lattice energy leads the authors to assume that the laws obtained for the single crystals are also applicable to the polycrystals used commercially. Finally, the authors discuss the connection between the physico-chemical properties of solid solutions of alkali-halide salts. It is said that the introduction of admixtures into the crystal can lead to a change in the interaction between the particles of the crystal lattice of the substance. Experimental data on the physico-chemical Card 7/18

S/063/60/005/005/012/021 A051/A029

Physico-Chemical Problems of Dielectrics

Card 8/13

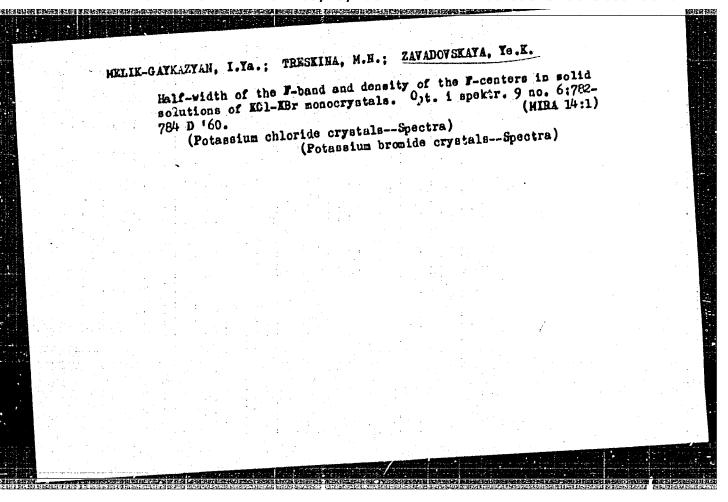
properties of solid solutions of ionic compounds are compared and certain assumptions are therefrom derived on the interaction of ions in the investigated systems. The most important value characterizing solid solutions is their heat of formation and reference is made to the formula used by Grimm (Ref. 61) for caluclating the energy of the crystal lattice. The heat of formation of the solid solution is estimated experimentally as the difference between the heats of dissolution of the solid substance and the mechanical mixture of components having the same weight and composition. The conrection between the heat of formation and the electrical properties of the alkali-halide solid solutions is noted. The electrical strength of NaCl-NaBr, KBr-KJ, KCl--KBr, NaBr-KBr is lower than that of the components. Solid solutions formed by heat absorption have a weakened structure and are characterized by a lowered electrical, schematic and thermal strength, high dielectrical losses and a defective structure. The electrical characteristics of dielectrics are connected with other properties, e.g., in the case of ionic crystals with the lattice energy, in homeopolar crystals with the energy of atomization, in molecular crystals with the energy of intermolecular bonds and in solid solutions with the amount of heat liberated in their formation. All these values are the higher, the higher the mechanical, thermal, chemical and elec-

Physico-Chemical Problems of Dielectrics

S/063/60/005/005/012/021 A051/A029

trical strength of the dielectrics. The authors point out that in selecting new materials for dielectrics compounds with highly-charged atoms (boron, sinew materials for dielectrics compounds with highly-charged atoms (boron, sinew materials for dielectrics compounds with non-deforming atoms creating rigid bonds licon, etc.), should be combined with non-deforming atoms creating rigid bonds licon, etc.). It is worthwhile to investigate the possibilities of using temperatures and pressures obtained in explosive processes and ities of using temperatures and pressures obtained in explosive processes and electrical explosions when producing dielectrics to overcome the high activation barriers of the reaction. The problem of selecting new dielectrical tion barriers of the reaction. The problem of selecting new dielectrical tion barriers of the reaction. The problem of selecting new dielectrical tion barriers of the reaction. The problem of selecting new dielectrical tion barriers of the reaction. The problem of selecting new dielectrical tion barriers of the reaction. The problem of selecting new dielectrical tion barriers of the reaction. The problem of selecting new dielectrical tion barriers of the reaction. The problem of selecting new dielectrical tion barriers of the reaction. The problem of selecting new dielectrical tion barriers of the reaction. The problem of selecting new dielectrical tion barriers of the reaction. The problem of selecting new dielectrical tion barriers of the reaction. The problem of selecting new dielectrical tion barriers of the reaction.

Card 9/17



APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001963920016-4"

VOROB'YEV, A.A., prof.; ZAVADOVEKATA, Ye.K., prof.; BOLDYREV, V.V., kand.khimicheskikh nauk; MELIK-JAYKAZYAN, I.Ya., kand.fiziko-matematichesmatematicheskikh nauk; SAVINTSEV, P.A., kand.fiziko-matematichesmatematicheskikh nauk;								
skikh nauk Physicochemical	aspects of dielectrics. Zhur. VKHO 5 no. 5:573- (MIRA 13:12)							
582 '60.	(Dielectrics)							
	Barrier 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1							

是是国际政策								•	
	THESKINA, M.H.								
MELIK-GAYKAZYAN, I.Ya.; ZAVADOVSKAYA, Ye.K.; TRESKINA, M.N. Distribution of impurities in crystals of alkali halide salts. (MIRA 13:8)									
I	Distribution o Kristallografi	f impurities is 5 no.3:4	77-478	60.		(MIRA 1)):8)		
	1. Tomskiy pol		inatitu	it im. S.	H.Kirov	a.		•	
	1. Tomskiy Pol	litekhnicheski Alkali halide	crystals))					
	·*'	· I Real						•	
					1 - 1				
					: * * * * * * * * * * * * * * * * * * *				
		and the second							
						•		٠.	
								•	
					. A				
								-	
No. 11			1.						
				· •.	•				
		Contractive Contract	ali (1876 - 187 <u>4)</u>				1		

24,7200 (101/3,1106,1385)

5/051/60/009/006/012/018

E201/E191

AUTHORS:

Melik-Gaykazyan, I.Ya., Treskina, M.N., and

Zavadovskaya, Ye.K.

The F-Band Half-Width and the Density of F-Centres in

Monocrystalline KC1--KBr Solid Solutions TITLE:

PERIODICAL: Optika i spektroskopiya, 1960, Vol.9, No.6, pp 782-784

TEXT: Several workers (Refs 3-5) studied imperfections in solid solutions of alkali halides. The degree of imperfection was taken to be represented by the difference between the density measured by weighing and the density deduced from X-ray diffraction crystallography. If the imperfections are all Schottky defects (vacancies), then the maximum of the degree of imperfection should occur at the same composition at which the half-width of the F-band is greatest. This was found to be true in KC1--KBr crystals (Ref.5): the maxima of the F-band half-width (Ref.1) and the number of Schottky defects both occurred at 60 mol % RbCl in KCl. The present paper deals with KC1--KBr crystals grown from solution and from melt. It was found that the maximum of the Schottky defect density (X y) occurred at about 80% KBr, compared with the

Card 1/2

S/051/60/009/006/012/018 E201/E191

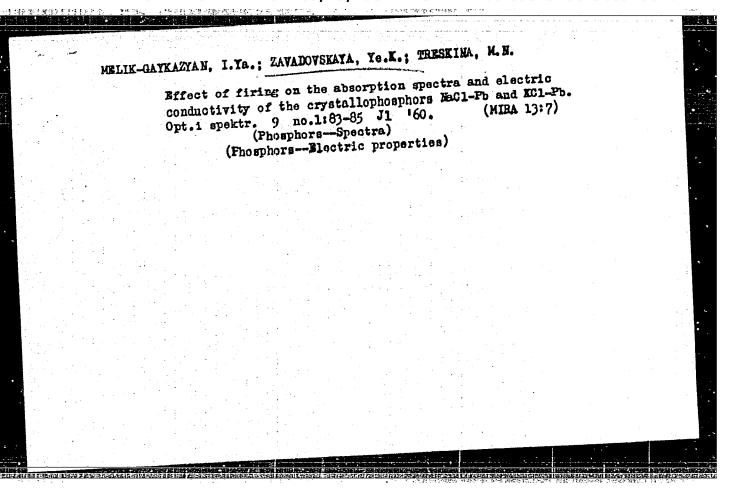
The F-Band Half-Width and the Density of F-Centres in Monocrystalline KC1--KBr Solid Solutions

maximum of the F-band half-width (γ) which was at about 70% KBr (Fig.1). It was also found that the density of F-centres (n_o) had a maximum at about 50% KBr and minima at 20% and 90% KBr (Fig.2). The value of n_o was lower in KBr--KC1 solutions than in pure KBr or in pure KC1, due to the lower stability of Acknowledgements are made to V.V. Boldyrev and A.D. Shchelokov for their advice.

There are 2 figures, 1 table and 6 references: 2 Soviet, 2 English, 1 German and 1 translation from English into Russian.

SUBMITTED: May 3 , 1960

Card 2/2



WOROB'YEV, A.A.; ZAVADOVSKAYA, Ye.K.; IVANKINA, M.S.; SAVINTSEV, P.A.

Physical properties of solid solutions of alkali halide compounds, and the molecular concentration. Izv.vys.ucheb.zav.; (MIRA 13:6)
fiz. no.6:162-165 '59.

1. Tomskiy politekhnicheskiy institut imeni S.M.Kirova.
(Alkali metal halides) (Solutions, Solid)

ZAVAdONSKAYA, YE. K.

s/181/60/002/04/19/034 B002/B063

Ivankina, M. S., Melik-Gaykazyan, Zavadovskaya, Ye. K.,

T. Ya.

TITLE:

The Problem of the Influence of Annealing on the Physical Properties of Solid Solutions of Alkali Haloid Salts

PERIODICAL:

Fizika tverdogo tela, 1960, Vol. 2, No. 4, pp. 665-669

TEXT: Mixed crystals composed of 51% KCl and 49% KBr, as well as 49.3% NaCl and 50.7% NaBr were bred by Kyropoulos' method. The crystals were kept at 600°C for 5, 10, 20, 25, 50, and 75 hours; the temperature was kept constant with an accuracy of + 2°C with the aid of the recording device 3HII-09 (EPP-09). The following was then measured on the crystals: density, lattice constant, molecular concentration, linear expansion coefficient, and heat conductivity (Tables 1 and 2). The cleavege faces of the orystals were examined with the aid of a polarization microscope and the camera " 3ehut" ("Zenit"). (Figs. 1, 2, and 3). On heating, the vacancies are concentrated and form negative crystals inside. The faces [100] and {110} are particularly developed. Cleavage cracks are the cause of the X

Card 1/2

The Problem of the Influence of Annealing on the Physical Properties of Solid Solutions of Alkali Haloid Salts

81959 S/181/60/002/04/19/034 B002/B063

resulting pores which are aligned in one row (Fig. 3). Since the vacancies migrate also to the free crystal surface, a longer heating also leads to a slight increase in density. The temperature dependence of the electrical conductivity of a K(Cl,Br) crystal was also determined. The said crystal was heated four times successively (Fig. 4). After each heating, conductivity rose further. This is possibly also due to the pore formation. Mention is made of papers by R. I. Garber, L. M. Shamovskiy, and Ya. Ye. Geguzin. There are 4 figures, 2 tables, and 9 references: 8 Soviet and

ASSOCIATION:

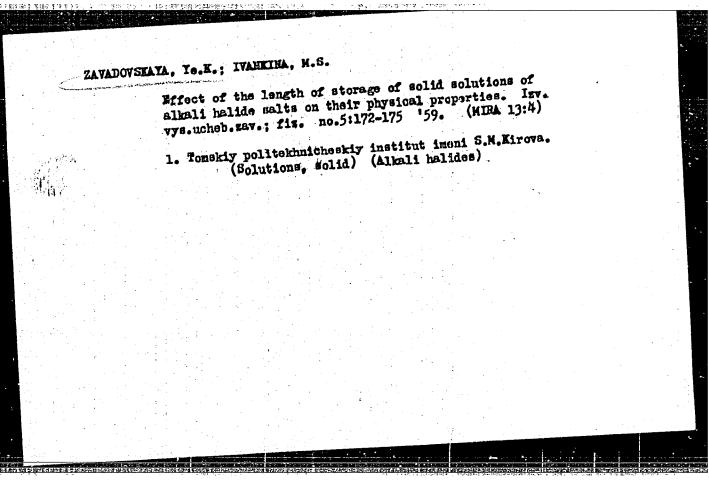
Tomskiy politekhnicheskiy institut

(Tomsk Polytechnic Institute)

SUBMITTED:

June 16, 1959

Card 2/2



15-57-1-507

Translation from: Referativnyy zhurnal, Geologiya, 1957, Nr 1,

p 82 (USSR)

AUTHOR:

Zavadovskaya, Ye. K.

TITLE:

Relationship Between Lattice Energy and the Physical-Chemical Properties of Single Crystals of Cesium Chloride, Wurtzite, Zinc Blende, and Rutile (Svyaz' mezhdu energiyey reshetki i fiziko-khimicheskimi svoystvami monokristallov tipa khloristogo tseziya, vyurtsita, tsinkovoy obmanki i rutila)

PERIODICAL:

Izv. Tomskogo politekhn. in-ta, 1956, Vol 83, pp 251-

255.

ABSTRACT:

The relationship of lattice energy to valence and ionic radius in ionic crystals is expressed by the equation of A. F. Kapustinskiy. A relationship is to be expected between the properties of crystals and the value of

lattice energy in ionic crystals having different types of lattice. Such relationships were found for combi-

Card 1/3

nations crystallizing with the lattice type of fluorite,

15-57-1-507

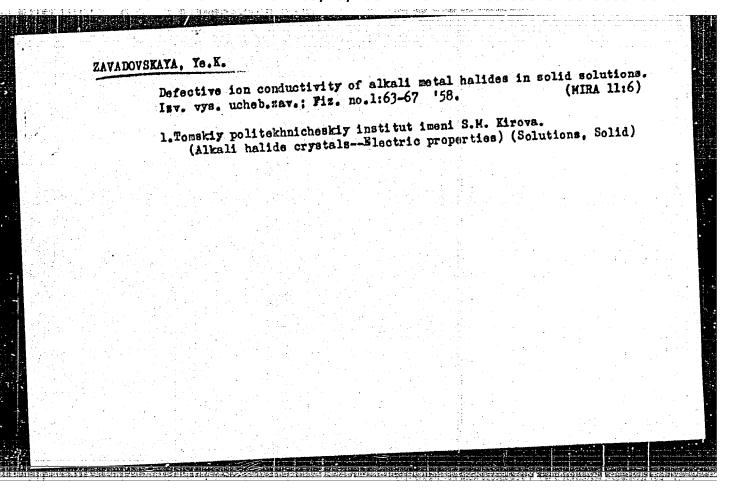
Relationship Between Lattice Energy and the Physical- (Cont.)

cesium chloride, wurtzite, and zinc blende. A graph showing relationship of molecular volume to lattice energy for these minerals shows that the lattice energy, as in lattices of the NaCl type, increases with reduction in molecular volume and ability to polarize of the compound. The largest values of lattice energy are found in combinations that crystallize in lattices of the wurtzite type; the smallest values belong to crystals with a cesiumchoride lattice. A complication in the crystal lattice is accompanied by increase in lattice energy. In the investigated group of compounds, the physical properties change with a change in lattice energy, in a manner similar to the group of alkali-halogen crystals of halite type. The indices of refraction for crystals of the fluorite type decrease with increase in lattice energy. the same cation, the index of refraction and the ability to polarize are less in fluorides than in chlorides. The fusion temperature of alkali-halogen compounds with lattices of the cesium-chloride type increases with increase in lattice energy. In crystals with lattice of the fluorite and cesium-chloride type, the specific heat increases with increase in lattice energy, as it does for alkali-Card 2/3

Relationship Between Lattice Energy and the Physical- (Cont.)

halogen salts with lattices of the halite type. The lattice energy of crystals with the different lattice types increases with increase in heat of formation of the compound. The results obtained permit one to broaden the laws concerning the changes of physical-chemical, thermal, and electrical properties, according to changes in lattice energy observed in crystals of the halite type, to encompass ionic crystals with lattices of two types. Such a generalization may be very useful; for example, for considering the isolation of materials for a certain value of lattice energy and, consequently, for preparing a dialectric with definite properties.

A. A. L. Card 3/3

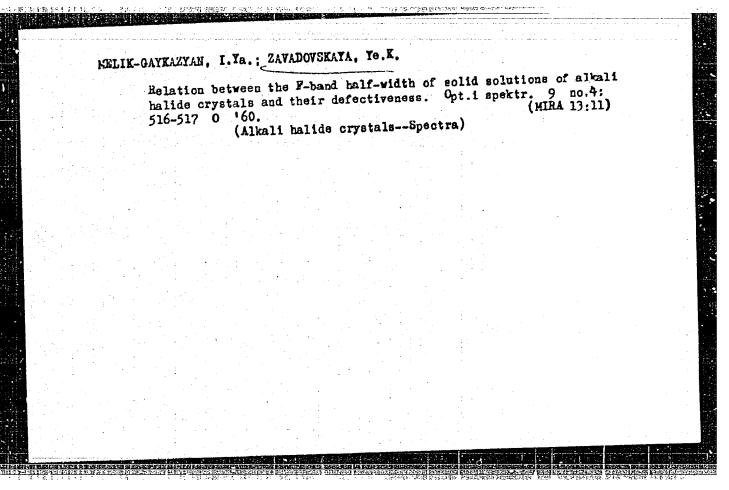


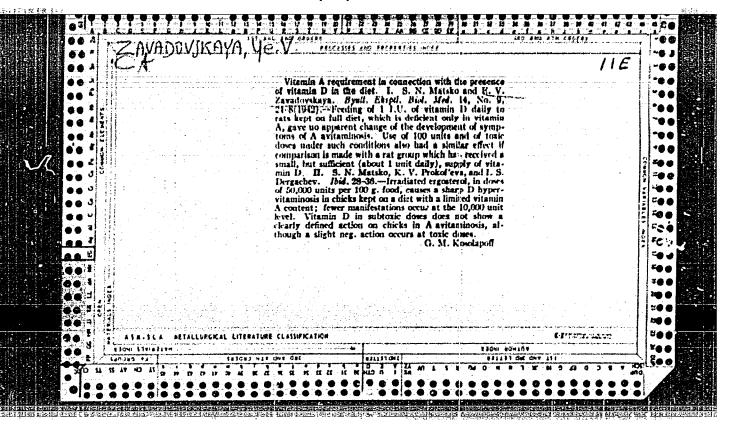
**The character of the dependence of the electric conductivity of solid solutions on the composition in the case of temperature variation is determined by the interaction forces of the ions in the crystal"

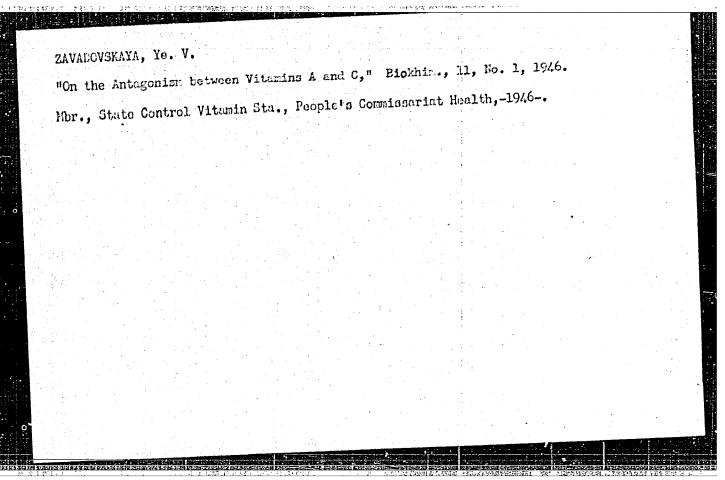
Report presented at a Conference on Solid Dielectrics and Semiconductors, Tomak Folytechnical Inst., 3-8 Feb. 58.

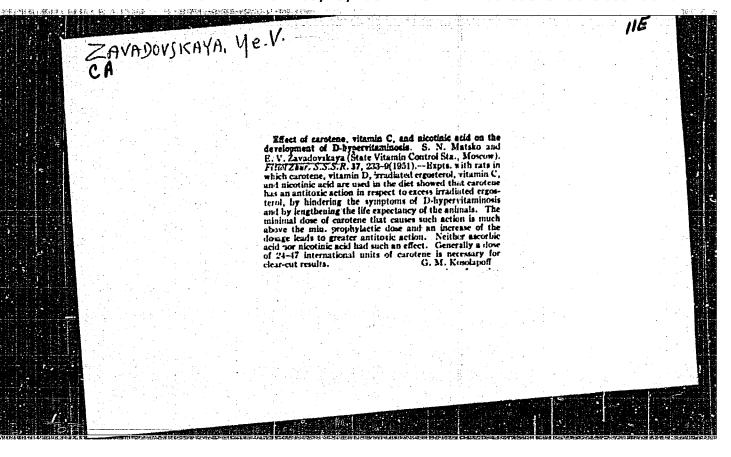
(Elektrichestvo, '58, No. 7, 83-86)

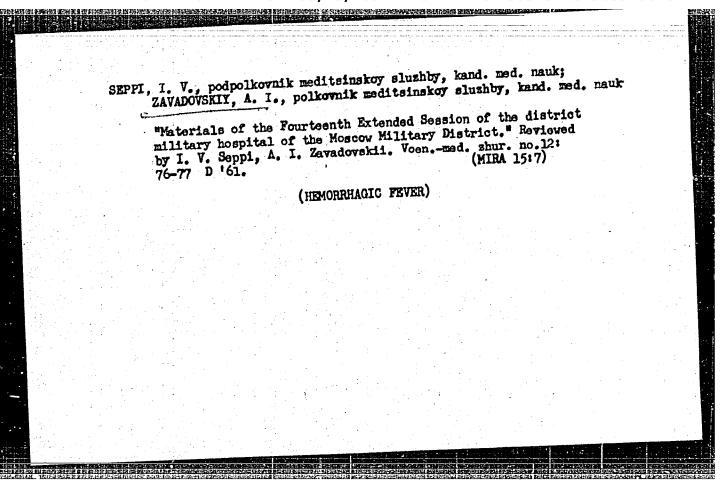
			4										ME		_				 144	1	+4,	\na			
					Effe of a	ict (of a li h	nne ali	ali:	g o	n t	he p	bys tv	ica er.	l pr tel	ope a 2	rtie no.	4:6	669 (IRA			<i>,</i> μ3			
												gangi.							 						
					3 (romal	-1	200	4 tal	chn 1	iche	sk1	7 11	eti	tut	•									
3					1.	COMP	713	Por			Ü	lka	11 1	111	de (crys	tale)			100				
											. •-														
			٠,			-1		. : -																	
					وی چانده می معادمین وی آدامند									<u>.</u>					 	1441					12.5
	17.114												• 5 ·			`	Marya a		 : .					:	٠. •
الباسا				وحفادات	عنب أحدث												and the second		 						
												·							 			-:-			•
		71								ta tir															
		1																							
1.1																								1	
			* 4	• •	75	1		* * *	17.5									٠							1
		1	:		1 .					-1															
,			- 31																				1.1		
- : -																									
					100				+1.	. 4			٠.,												
	100					i., in the																			
					3000																		- 27		
					1.																				
	4.3	4.10															4								
	1										. :											4.	-	. :	
200													•												

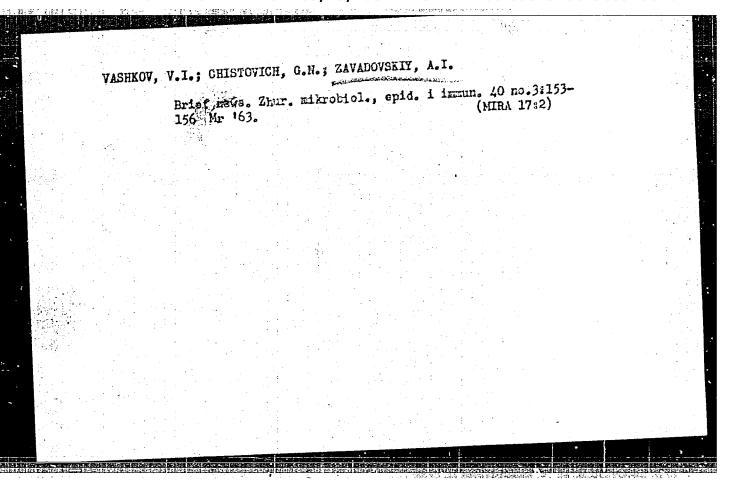


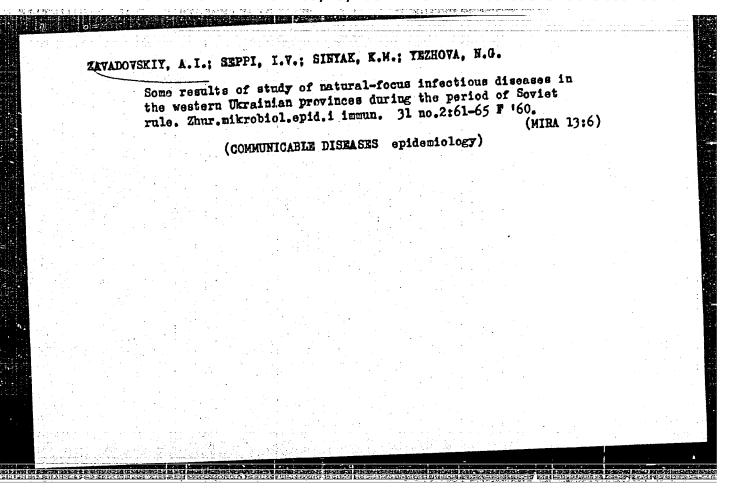


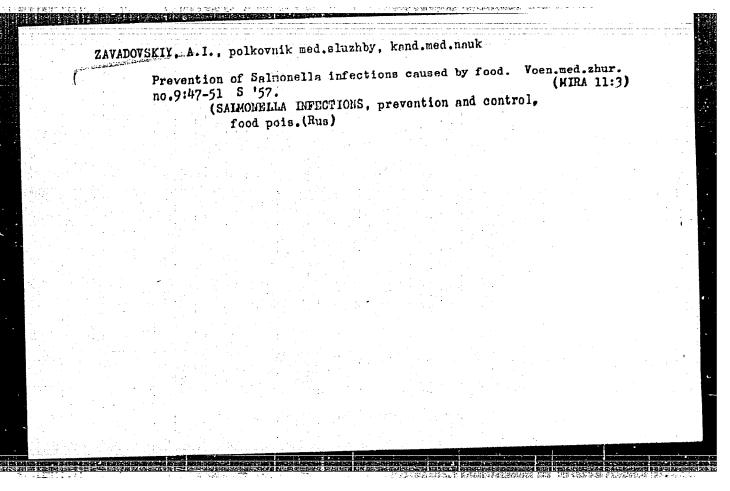


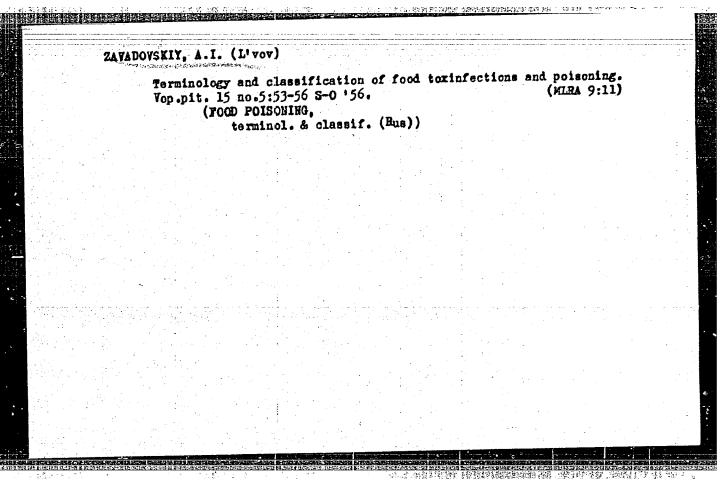


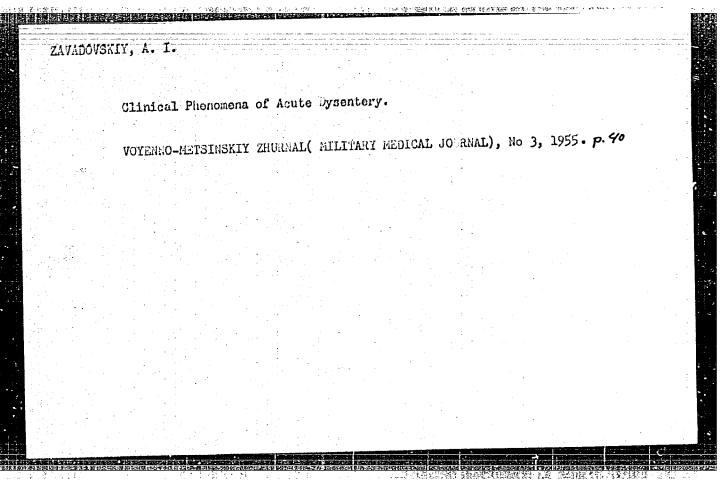


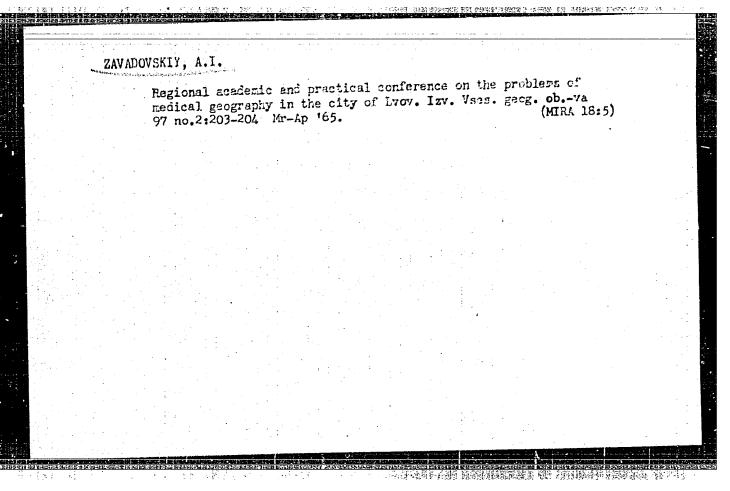


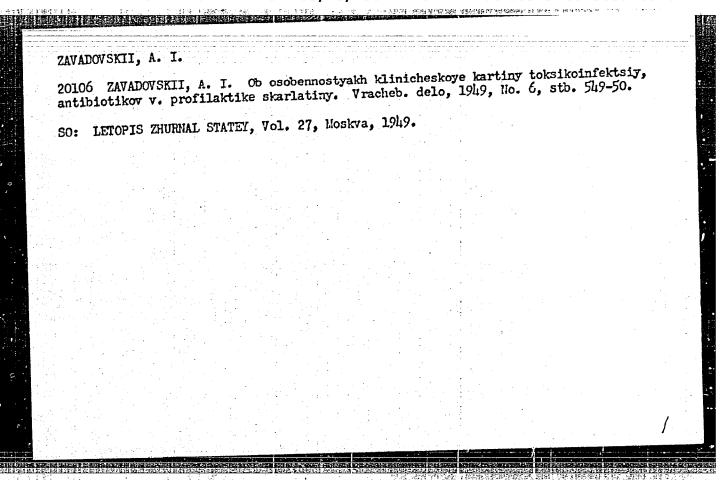












AID P - 2869

ZAVADOVSKIY, A.M

Subject

USSR/Engineering

Card 1/1

Pub. 110-a - 2/16

Author

Zavadovskiy, A. M., Kand. Tech. Sci.

Title

Influence of certain design elements upon turbine

stage characteristics

Periodical

: Teploenergetika, 10, 9-13, 0 1955

Abstract

Results of experiments made with MGT-1 and MGT-2 one-stage turbines on axial and vertical gaps between wheels and diaphragms. Experimental data are given in detail and a mathematical analysis is

included. Eleven diagrams.

Institution: Central Boiler and Turbine Institute

Submitted

No date

CIA-RDP86-00513R001963920016-4" APPROVED FOR RELEASE: 03/15/2001

ZAVADOVSKIY, A.m.

PERIODICAL ABSTRACTS

Sub.: USSR/Engineering

ZAVADOVSKIY, A. M.

K VOPROSU O RASCHETE PORSHNEVYKH GENERATOROV GAZA GAZOTURBINNYKH
USTANOVOK (On designing piston compressors in gas turbine units).
Teploenergetika, no. 1, Ja 1956: 29-35.

A theoretical analysis of the various processes which occur in piston compressor operating under varying working conditions. A simplified method for their computation and design is presented. Eleven diagrams.

ZAVADOVSKIY, A.M., kandidat tekhnicheskikh nauk.

Determining the ranges of transition from cylindrical to twisted blading in the stages of steam and gas turbines.

Energomashinostroenie no.8:13-15 Ag '56. (MLRA 9:10)

(Steam turbines--Blades) (Gas turbines--Blades)

ZAVALGERAKIX, A.M.

114-8-8/16

AUTHOR: Zavadovskiy, A.M., Candidate of Technical Sciences.

The influence of gaps at the butts of shroud segments of working wheels on the characteristics of turbine stages.)

(Vliyaniye shcheley v stykakh segmentov bandazhey rabochikh koles na kharakteristiki turbinnykh stupeney)

PERIODICAL: "Energomashinostroyeniye" (Power Machinery Construction), 1957, Vol.3, No.8, pp. 26 - 27 (U.S.S.R.)

ABSTRACT: In steam and gas turbines the blade shrouds on the runners are made up of segments between which gaps are left. The number of gaps on a wheel depends on the numbers of packets of blades, and on some gas turbine blades, when the shroud is made integral with the blade, the number of the gaps is the same as the number of blades.

These gaps cause power losses about which very little has been published. There is experimental evidence that the losses may be quite appreciable when the blades are short. A brief mathematical analysis of the question is given. Tests were made, first with a continuous shroud on the wheel; the test results were used to plot the efficiency curves shown in Fig. 2. The shroud was then cut into sixteen segments with gaps 1.0 mm wide. The tests were repeated, and the results plotted in Fig. 3, show that in this case the maximum efficiency Card 1/2

The influence of gaps at the butts of shroud segments of the working wheels on the characteristics of turbine stages.

(Cont.)

114-8-8/16

was 0.5% lower than before. Increase in the gap width to 1.5 mm caused a further appreciable drop in efficiency.

The losses are a result of very complex effects due to flow of working medium from the bide channels through the gaps, and also to change of the flow structure in the channels. It was not possible to calculate the losses. However, they could be easily evaluated from experiments as shown in Fig.4. It is concluded that the influence of the gaps in the shrouds on the stage of efficiency is practically equivalent to the influence of the axial gap between the shroud and the diaphragm. In the present tests the degree of reaction changed very little.

There are 4 figures and 1 Slavic reference.

AVAILABLE: Library of Congress

Card 2/2

AUTHOR:

Zavadovskiy, A.M. (Card. Tech. Sc.) (Central Boiler-

Turbine Institute).

TITLE:

Relationships that characterise the throughput capacity of a turbine stage. (Zavisimosti kharakterizuyushchiye propusknuyu sposobnost' turbinoy stupeni).

PERIODICAL: "Teploenergetika" (Thermal Power), Vol.4, No.4, April, 1957, pp.6-10. (U.Ś.S.R.)

ABSTRACT:

One of the main aerodynamic characteristics used in the design of the flow part of steam and gas turbines is the relationship that characterises the throughput capacity of a stage when the working medium passes through it. This capacity depends on many factors. This article presents a method of determining the relationships that characterise the throughput of a turbine stage and a functional relationship is established between the main aerodynamic characteristics of the stage. A formula is given for the flow factor which is the ratio of the actual to the theoretical flow. Corresponding expressions are given for the fixed and working blading. The method of determining the theoretical flow is presented on the assumption that the theoretical velocity corresponds to the total heat drop on the stage and the flow area is equal to the narrow section of the channels between the blades. The most reliable data on the throughput characteristics are

Relationships that characterise the throughput capacity of a turbine stage. (Cont.) 251

obtained by tests on actual turbine stages. This necessitates detailed investigation of the flow before and after each blade along the pitch and height of the blades with subsequent averaging. This method is very complex and laborious. It is particularly difficult to determine the area of the channels with sufficient accuracy when the outlet angles are small. It is much easier to make the measurements under static conditions than in an experimental turbine but the flow factors determined in this way require correction. Several formulae are given to facilitate determination of the flow passing capacity of a stage. The relationship that is established between the main aerodynamic characteristics of stages makes it possible to use two total characteristics of a turbine stage to find the third. The practical results that can be obtained from tests on stages in experimental turbines are explained.

No figures, no literature references.

Zavadovskiv, A.M., Candidate of Technical Sciences (Central Boller and Turbine Institute). AUTHOR: On the selection of the degree of reaction in the stages of high pressure steam turbines. (O vybore stepeni reaktsii v stup-TITIE: enyakh vysokogo davleniya parovykh turbin.) "Teploenergetika" (Thermal Power), 1957, Vol. 4, No. 6, PERIODICAL: pp. 40 - 42 (U.S.S.R.) The high pressure stages of steam turbines have high D/1 ratios so that simple blade forms can be used. Blade heights ABSTRACT: are small so that a considerable proportion of the power losses in a stage consists of flow boundary losses. Therefore, in designing turbine stages with short blades account must be taken of steam leakages round the blades. With a small value of reaction on the design diameter (usually the mean diameter) the degree of reaction on the peripheral diameter will be small and leaks at the shrouds will be small. However, the blade root is then working in unfavourable conditions of negative reaction. In view of the complexity of the effects that take place in the flow part of a turbine, particularly when there is negative reaction and inflow of steam, an experimental investigation was made on one type of blading. The object of study was a stage with cylindrical blading and profiles types TH-2 and T-2. The height of the guide blades was 30 mm, the height of the working blades 34 mm, the mean wheel diameter 433 mm. The overlap at the shroud was 3 mm and the overlap on the internal diameter 1 mm.

On the selection of the degree of reaction in the stages of high pressure steam turbines. (Cont.)

of the guide blades was 35 mm and of the working blades 20 mm. The tests were made in the Central Boiler-Turbine Institute on an experimental air turbine type MFT-2. To cause leakage-in of air the chamber before the wheel was connected through a throttling valve to the working-medium supply pipe. For the case of leakage-cut the working wheel chamber was connected

to atmosphere.

The experiments revealed the influence on the stage efficiency of losses caused only by reaction and leakage through the clearances. The results are plotted on a graph which shows the change in the maximum efficiency of the stage (without using the exit velocity) and the reaction on the mean diameter as functions of the reaction on the root diameter for various values of leakage-in. The curves show that in the type of Stage considered there is an optimum maximum value of stage reaction the position of which depends on the amount of leakagein. The curves also show that for small values of reaction (less than the optimum) the leakage-in of air considerably reduces the stage efficiency. Above the optimum value increased leakage-in of air reduces the losses due to interaction of the incoming and main flows.

A further graph of the change in the maximum value of the stage efficiency (when the exit velocity is used) as function

Card 2/4

CIA-RDP86-00513R001963920016-4"

APPROVED FOR RELEASE: 03/15/2001

645

On the selection of the degree of reaction in the stages of high pressure steam turbines. (Cont.)

of the reaction at the root diameter shows that in this case the change in the efficiency is of the same character. When there is negative reaction the flow of medium leaking-in changes in direction and is accelerated at the expense of the energy of the main flow. If the reaction is positive, the gain in speed is partly the result of pressure drop, but in this case too the air leaking in reduces the efficiency. This is shown in curves of change of stage efficiency (without using outlet velocity) as function of the reaction at the root diameter. Unlike the previous graph, these curves reflect, in addition to the effect of the leaking-in on the main flow, the loss of efficiency that results from diminution of the main flow by the amount of leakage.

In order to investigate effects in the zone of negative reaction, visual observations were made of the flow in the gap between the guide blades and the working wheel. A special device was designed and made for this purpose, which consisted of observation windows, a lighting apparatus and probes with fine threads. The attitude of the thread in the flow could be seen. In none of the experiments was reversed flow observed; in regions of negative reaction there was only more turbulence.

The influence of leakage-out of air on the stage characteristics was investigated when the leakage did not exceed 0.5%. The data are plotted in a graph, and show that such a small

On the selection of the degree of reaction in the stages of high pressure steam turbines. (Cont.)

The following practical conclusions may be drawn from the work: for turbine stages with short blades there is an optimum value of reaction which depends mainly on leakage through the gap at the peripheral diameter of the stage and also on leakages in and out through the root diameter of thestage. The optimum working conditions of a turbine stage with short blades occur when the reaction is positive over the entire height of the blades. The amount of leakage-in has an important influence on the selection of the best value of stage reaction. Leakage-out of working medium through the slot at the root diameter in small amounts (less than 0.5%) had no important influence on the optimum value of stage reaction or on the stage efficiency.

6 figures, no literature references.

AVAILABLE:

Card 4/4

ZAVADOV	Note on the property on aerodynamical turbines.	oublication Boilers and calculat	of the Cent nd Turbines ion of the b	ral Scient entitled lading in	ntific B "Direct n statio	ivos nary 157.	11:1)	
. 19 1 10 1. 1. 1. 1. 1839: - 14 1. 1. 1. 1. 1. 1.		(Gas	turbines)			/www	11:11	
								·
						•		-
						•		
						*		

ZAVADOVSKIT AMA kand. tekhn. nauk; BABENKO, Eh.L., insh.

The effect of licks on the operation of a turbine stage. Teploener-gotika 5 no.1:28-31 Ja '58.

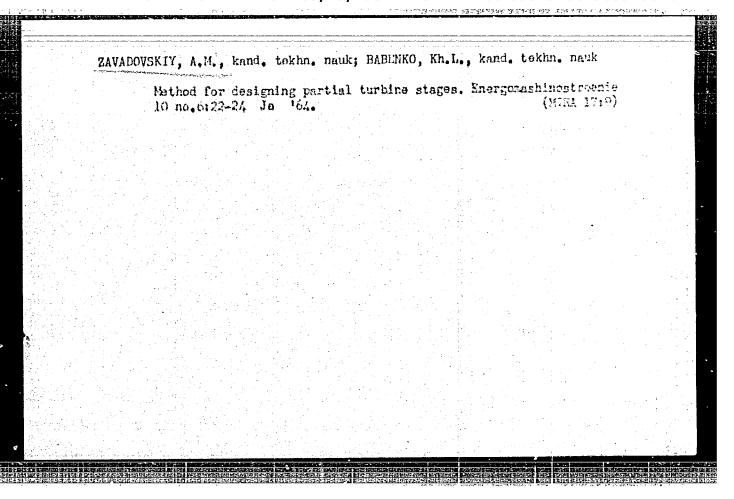
1. TSentral'nyy kotloturbinny institut.

(Turbines)

1. TSentral	nyy kotlotu	nhinger instit			
	• •	I namiji ama	uto		
					*,

L 31:65-66 EMP(f)/T-2/ETC(m) ACCESSION NR: AP5024138 UR/0096/65/000/010/0063/0068 AUTHOR: Zavadovskiy, A. M. (Candidate of technical sciences); Berkovich, TITLE: Some questions in the investigation of grids of turbine profiles SOURCE: Teploenergetika, no. 10, 1965, 63-68 TOPIC TAGS: turbine design, thermodynamics, steam turbine in the state of the state ABSTRACT: To work out methods for the design and calculation of elements for the flow through section of a low pressure condensing turbine, it is necessary to create a series of high efficiency profiles for the guiding and operating vanes An important part of this work is the perfecting of profile grids in special steam The article gives a survey of the basic problems involved in the modelling of a process involving flow plast profile grids. The article first derives in expression for the loss coefficient in the superheated steam region. This is a measure of the power characteristics of the grid. The article goes on to consider the case where the process in the grid begins in the superheated steam region and ends in the wet steam region. Thermodynamic considerations lead to an express-

ASSOCIATION: Tsentral'nyy kotloturbinnyy institut (Central Boiler Turbine Institute) SUBMITTED: 00 ENCL: 00 SUB CODE: FR. ME NE REF SOV: 004 OTHER: 001	show that the direction of the wanes approximately coincide. exit of the stream. The final erizes the throughput capacity effects. Orig. art. has: 16 for	t .	
and the state of the	Institute)		
		OTHER: 001	



ZAVADOVSKI	Y A.M	kand, te	khn _* nauk	i, zivi	(OVSKIY)	, G.V.,	insh.				
Si aı	eries of ngles. I	stages zv. vys	of a gas . ucheb.	turbi zav.;	na syst	em with	h large 0.7:56-	61 JI	cutput '63. MIRA 16:	- g)	
1.	. TSentra	l'nyy k	otloturb	innyy	institu	it imori	1 I.I.P	olzuno	va.	10)	
					esD)	turbin	os)				• :
											: :
		i di Salah Kabupatèn Kabupatèn Kabupatèn Kabupatèn Kabupatèn Kabupatèn Kabupatèn Kabupatèn Kabupatèn Kabupatèn Kabupatèn Kabupatèn					•				
Algebra (1997)		1.14					· Pages				
						and the					÷
				1.37							
				an Taylor III					. •		
									•		
											. 1 1 •

ZAVADO	WSKIY, A.M., kand. tekhn. nauk
	Effect of the pitch and angle of the guiding blades on the operation of a turbine stage. Teploenergetika 8 no.4:26-30 Ap '61. (MIRA 14:8)
	1. TSentral'nyy kotloturbinnyy institut. (Turbines)
	발발하고 하는데 그는 그래프로 하고 있는데 그는 이 아는 그는 그는 그를 보고 있다. 1984년 - 1987년 - 1984년
	고급보다는 한 전환 생활을 보고 있다. 그는 사람들이 다른 생활을 가지 않는데 그리고 있다. 소개를 하는데 나는 사람들은 사람들이 되었다. 그 사람들이 다른 사람들이 되었다.
	일을 받아 되었다. 이 전략에 나는 보이 하는데 그리는 그 등이 하는 것은 뿐이 하는데 하는데 *** 1996년 이 1997년 및 1997년 1일
	ndine (Section and Explosion), and a section of the
	한 경기 경기 있는 사람들이 되었다. 그 사람들은 사람들이 되었다. 그런 사람들이 되었다. 그런 보다 하는 사람들이 되었다. 사람들이 하는 사람들이 사람들이 가장 보고 있다. 그런 사람들이 가장 보고 있는 것이 되었다.
	현실 등 경기 전 경기 등 보고 있다. 그는 사람들은 보고 보고 있는 것이 되는 것이 되었다. 그런

87964

s/114/60/000/007/005/009 E194/E455

AUTHORS:

Zavadovskiy, A.M., Candidate of Technical Sciences, Babenko, Kh.L., Engineer and Agafonov, V.A., Engineer

Formation of the Flow Path of a Turbine by

Undercutting Blades of the Initial Stage TITLE:

PERIODICAL: Energomashinostroyeniye, 1960, No.7, pp.19-21 Work of the Central Boiler Turbine Institute has shown that in forming and designing the flow paths of turbines, it is advisable to proceed by the method of model stages. In this method, the initial stage is modified by undercutting the runner blades from the periphery and the guide vanes from the shaft end. The pitch of the guidevanes at the mean diameter is maintained This method may be applied to a stage, to a group of stages, or even to a turbine as a whole. Before a stage can be used as an initial stage, certain information is required about its performance and design characteristics. The characteristics constant. of the initial stage and the corrections to them resulting from undercutting can, in principle, be calculated or determined by a test on a rotating turbine, which is very much more satisfactory

card 1/4

8796h

s/114/60/000/007/005/009 E194/E455

Formation of the Flow Path of a Turbine by Undercutting Blades

Similarly, it is currently desirable to create a series of initial stages to satisfy the of the Initial Stage in the present state of knowledge. gives information about one of the initial stages developed in requirements of steam and gas turbine design. the Central Boiler Turbine Institute and shows that under certain conditions, considerable changes may be made in the geometrical dimensions of the initial stages without appreciable change in the efficiency, flow characteristics, reaction and other characteristics, The initial stage has cylindrical guide vanes and corresponds closely to profile TH-2 (TN-2) of the Central Boiler Turbine The runner blades are twisted; Fig.1 shows their profiles at five sections along the height. During the course of the tests, the runner blades were shortened from the top, while or the tests, the runner praces were shortened from the number of blades and angle of installation remained unaltered. Correspondingly, the free ends of the guide vanes were cut off. Geometrical data about the stages used are tabulated. blades were unshrouded but both ends of the guide vanes were let into the turbine frame, so that there were no leaks between them Card 2/4

87964

S/114/60/000/007/005/009 E194/E455

Formation of the Flow Path of a Turbine by Undercutting Blades

and the rotor. During the course of the investigations of each individually-produced stage, the angle of installation of the guide vanes was altered several times. The results of the tests are plotted in Fig. 2 to 8, curves being given of efficiency, change of total pressure, change of reaction along the radius, change of efficiency as a function of gap between the rims, and The uniform pressure distribution beyond the discharge from the stage signifies that the stage investigated will be of high efficiency even when it is used as an intermediate stage over a wide range of velocity ratios. efficiency obtained when testing stages newly-formed by Numerous data on undercutting blades with the same angle of installation of the guide vanes showed that the efficiency commences to drop only when the blades are very short. undercutting the blades could increase the reaction, but this could be reduced to the optimum value by altering the angle of The maximum value of stage efficiency is plotted Card 3/4

87964 S/114/60/000/007/005/009 E194/E455

Formation of the Flow Path of a Turbine by Undercutting Elades

as a function of the closed axial gap and the shape of the curve confirms the existing opinion that two main factors are particularly important in this case, namely the influence of variations in flow before the runner rim and losses due to friction in the angular surfaces. It is concluded that this method of forming the flow paths of turbines is simple and easy to make. It should afford the possibility of introducing extensive standardization of turbine stages. There are 8 figures,

Card 4/4

PHASE I BOOK EXPLOITATION

sov/5093

Zavadovskiy, Anatoliy Mikhaylovich

- Osnovy proyektirovaniya protochnoy chasti parovykh i gazovykh turbin (Fundamentals of Designing the Flow-Passage Area of Steam and Gas Turbines) Moscow, Mashgiz, 1960. 246 p. Errata slip inserted. 4,000 copies printed.
- Reviewer: I. L. Povkh, Professor, Doctor of Technical Sciences; Ed.:
 K. G. Rodin, Candidate of Technical Science; Ed. of Publishing
 House: Ye. K. Gofman; Tech. Ed.: L. V. Shchetinina; Managing
 Ed. for Literature on the Design and Operation of Machines
 (Leningrad Branch, Mashgiz): F. I. Fetisov, Engineer.
- PURPOSE: This book is intended for engineers engaged in designing, producing, and operating steam and gas turbines. It may also be useful to students in technical schools of higher education.
- COVERAGE: The book describes modern methods of designing and calculating the flow-passage area of steam and gas turbines. These methods are based on theoretical and experimental material obtained

Card 1/6

Fundamentals of Designing (Cont.)

3

6

11 11

in investigations of airfoil cascades in wind tunnels and of stages in experimental turbines. The influence of some design parameters on the aerodynamic characteristics of stages and considerations on improving the flow-passage area are discussed. The Tsentral 'nyy nauchno-issledovatel skyy kotloturbinnyy institut imeni I. I. Polzunova (Central Scientific Research Institute for Boilers and Turbines imeni I. I. Polzunov) is mentioned. Kh. L. Babenko, Engineer, wrote sections 16, 24, 29, 30, and 31, and collaborated in writing Ch. IV. There are 57 references, all Soviet (including 4 translations).

TABLE OF CONTENTS:

Foreword

Conventional Symbols

Ch. I. Initial Materials for Designing Turbine Stages 1. Characteristics of blade airfoils

Card-2/6

and the statement between the properties and the state of the statement of

English Pilanghan mangahiga di be

ZAVADOVSKIY, Amstoliy Mikhaylovich: Prinimal uchastiye BABENKO, Kh.L., inzh. POVKH, I.L., prof., doktor tekhn.nauk, retsensent; RODIH, K.G., kand.tekhn.nauk, red.; GOFMAH, Ye.K., red.izd-vs; SHCHETININA, L.V., tekhn.red.

[Principles of designing the blading of steam and gas turbines]
Osnovy proektirovaniis protochnoi chasti parovykh i gazovykh
turbin. Moskva, Gos.nauchno-tekhn.izd-vo mashinostroit.lit-ry.
1960. 246 p. (MIRA 13:12)
(Steam turbines--Blades) (Gas turbines--Blades)

ZAVADOVSKIY, A.M., kand.tekhn.nauk; BARENKO, Kh.L., insh.; AGAFOXOV,											
		Forming stage.	the blad:	ing by und	lercuttir nie G	no.7:19	-21 41	f the 60.			
			(!	Rurbines-	Blades)						
Marin He											
										•	
									1		
									÷		
							4.				
							1, 1, 1				
		电热 杂块					+ N.,				
										1.	
					:						
										. :	1.0
						for a second	(, 4)				

chilinan sult u II.

PHASE I BOOK EXPLOITATION

SOV/4519

- Gukasova, Yekaterina Aleksandrovna, Mikhail Isaakovich Zhukovskiy, Anatoliy Mikhaylovich Zavadovskiy, Larisa Mikhaylovna Zysina Molozhen, Nikolay Akimovich Sknar, and Vsevolod Georgiyevich Tyryshkin
- Aerodinamicheskoye sovershenstvovaniye lopatochnykh apparatov parovykh i gazovykh turbin (Aerodynamic Improvement of Blading in Steam and Gas Turbines) Moscow, Gosenergoizdat, 1960. 340 p. Errata slip inserted. 4,000 copies printed.
- Eds.: V.S. Zhukovskiy, Doctor of Technical Sciences, Professor, and S.S. Kutateladze, Doctor of Technical Sciences, Professor; Tech. Ed.: 0.S. Zhitnikova.
- PURPOSE: This book is intended for engineers working in turbine-construction plants, design offices, and power systems, and may also be used by aspirants and students of advanced courses in power-machinery construction at schools of higher education.
- COVERAGE: The book discusses aerodynamic methods for investigating, profiling, and improving the blading of steam and gas turbines. Methods for calculating the potential flew about airfoil cascades and for determining energy losses on the basis

Card 1/9

Aerodynamic Improvement of Blading (Cont.)

807/4519

of the boundary-layer theory are presented. Also discussed are methods for experimental study of the flow about blades in stationary cascades (with consideration of three-dimensional phenomena) and on rotating models. A special chapter (IX) treats the results of aerodynamic profiling of new blade cascades. The results presented are based on work performed at TakTI imeni I.I. Polzunov. The authors thank Professor L.G. Loytsyanskiy for his advice. There are 124 references: 106 Soviet, 10 English, and 8 German.

TABLE OF CONTENTS:

어린다 가는 사람들은 얼마나를 하는 것은 사람들이 되는데 그렇게 되었다.	
Ch. I. Theoretical Methods of Calculating Incompressible Flow	
Through Cascades of Airfoils (M.I. Zhukovskiy)	11
1. Plane rectilinear cascade	11.
2. Calculating a cascade of blades according to a given velocity triang	le 15
3. Solution of a direct problem based on conformal mapping of the	
region of incompressible fluid flow in an auxiliary plane	23
4. Inverse problem for a cascade of airfoils	28
5. Calculating flow over a cascade of airfoils according to a	
known circulation flow for an angle \$,	30
6. Calculating flow in curvilinear channels	33

erodynamic Improvement of Blading (Cont.) 80V/4519	
1. II. Calculating Flow-Through Cascades at Subsonic Velocities (M.I. Zhukovskiy) 1. Isentropic motion of a compressible fluid 2. Subsonic flow of a gas through a cascade of airfoils	39 39 45
n. III. Approximate Method of Calculating Profile Losses in Cascades (L.M. Zysina-Molozhen)	48
1. Comparative evaluation of the precision of some methods of calculating profile losses	48
2. Method of calculating the size of impulse loss at the rear edge in flow through a cascade of airfoils	58
3. Determination of the dimensions of the transition region in the boundary layer of an airfoil	64
4. Sequence of the procedure of calculating the size of impulse loss at the rear edge in flow through a cascade of airfoils	70
5. Comparison of calculations with experimental values of losses in flow through impulse and reaction cascades of airfoils	76
6. Comparison of calculations with experimental values of losses in flow through the cascade of airfoils of a compressor	82

Aerody	namic Improvement of Blading (Cont.)	/4519
Th. IV	. Fundamentals of Modeling Aerodynamic Processes in a	
_	Turbine Cascade of Blades (N.A. Sknar')	87
1.	Principles of modeling	87
2.	Criteria of similitude and aerodynamic characteristics	
	of cascades	88
3.	Characteristic features of approximate modeling	91
2.	Experimental cascades Shaping the stream at the outflow from the cascade of blades Experimental units Measuring methods in the investigation of cascades in a	100 100 101 105 109 113
7	compressible gas	116
1.	Methods of working out experimental data	122
rd 4		
ard 4,	(9)	

Aerodyna	mic Improvement of Blading (Cont.) 80V/4519		
Ch. VI.	Optical Methods of Investigating Plane Cascades of Airfoils		
	(L.M. Zysina-Molozhen)	120	4
1. G	eneral principles of the shade method and its application	بحد	J .
1	n investigation of flow about bodies	12.	7
2. A	pplication of Toepler's method in investigation of flow		1
て	hrough cascedes of airfoils	. 3.20	5 1 1
3. P	rinciple of interference	130	
4. D	escription and adjustment of an interferometer	13	
)• P	hotographing the interference picture	130 130	
6. D	etermination of the physical density of the investigated	-5	,
<i>III.</i> /	edium by the combination of bands. Numeration of bands	141	L
7. De	etermination of the density in the presence of uncombined		•
8. De	aterference bands in the field of vision	144	,
O. De	stermination of density in the absence of uncombined		
0 0	aterference bands in the field of vision	145	,
9. U	otaining the scalar representation of the interferogram	346	;
11 G	alculation of basic gas dynamic parameters	146	,
	me results of interferometric investigation of flow bout bodies		
		151	
Card 5/9			
// /	이 눈으릴 때문이 느르면 얼마를 하는 그림으로 살아가고 있다.		1.41
	计控制 的复数人名英格兰 医多种皮肤皮肤 医乳腺 化二氯甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基		

	제품들은 어로 보이는 네 이글 보인 경험이다. 아들이 하고 하는 것이 없었다.		
Aerody	mamic Improvement of Blading (Cont.) 80V/4519		
12.	a cascade of compressor airfoils according to an interferogram	155	
Ch. VI	(Ye.A. Gukasova)		
	Structure of three-dimensional flow at the ends of blades. Mechanism of the formation of end losses.	158	
the second second	banded cascades	158	
	Influence of geometric characteristics of cascades and flow	176	
	in banded cascades	181	
144	Characteristic features of three-dimensional flow through straight banded cascades in the presence of overlapping and axial clearances	189	
	clearances of overtapping and axial	193	
ard 6/	경기 : 보통하는 이 사람들은 보다는 이 사람들이 하는 것이 되었다. 그 보다는 것이 되었다. 96 - 보다는 사람들은 사람들은 사람들은 사람들은 사람들은 사람들이 되었다. 그 사람들은 사람들은 사람들은 사람들은 사람들은 사람들은 사람들은 사람들은		
计图象 经货币	선생님들은 우리는 그 그 그리고 그렇게 한 생생님의 나는 것이 그 생생님은 생각하고 있었다.		

erodynamic Improvement of Blading (Cont.) SOV/4519	
h. VIII. Experimental Investigation of Plane Cascades at High Subsonic	
and Supersonic Velocities (Ye.A. Gukasova)	198
1. Flow of a compressible gas in cascades of nozzles	198
2. Flow of a compressible gas in cascades of buckets	212
h. IX. Some Results of Aerodynamic Profiling and Finishing-off of	•
Turbine Airfoils for Subcritical Flows at TsKTI (M.I. Zhukovski,y	
and N.A. Sknar')	219
1. General aspects	219
2. Vane profiles	221
3. Bucket profiles	222
4. Efficiency of new profiles	222
5. Influence of the method of formation of strengthened	
outflow edges on the operation of cascades	224
2. X. Methods of Experimental Investigation of Turbine Stages in	
Conditions of Rotation on Models at TaKTI (A.M. Zavadovskiy)	1
1. General aspects	230
2. Aerodynamic characteristics	230
e. verediumre dimindrellation	238
rd 7/9	

Aerodynamic Improvement of Blading (Cont.) 80V/4519	• .	.*
Ch. XI. Losses in a Turbine Stage and Consideration of the Possibility of Calculating the Basic Characteristics of the Stage (A.M. Zayadovskiy)	245 245	
 Profile and end losses Fan losses Losses due to leakage through radial clearances in nonshrouded 	252 258	
vanes 4. Losses due to leakage through axial clearances in stages with shrouded vanes 5. Losses due to leakage through gaps in contacts of working-	266 267	
wheel shrouds 6. Influence of suction and induction in a turbine stage with shrouded vanes 7. Losses due to the flow of the working fluid in channels of	270	
7. losses due to the flow of the reaction a turbine stage with negative reaction 8. Some considerations on the possibility of determining basic characteristics of a turbine stage by calculation	272 276	
Card 8/9		

Aerodynamic Improvement of Blading (Cont.) SOV/4519		
Ch. XII. Turbine Stage With Long Blades (V.G. Tyryshkin) 1. On designing turbine-stage blades with a small width	286	
to length ratio 2. Experimental investigation of the blading of turbine stages	286	
with small width to length ratios 3. On the influence of the degree of reaction and of basic constructional elements on the characteristics of a turbine	294	
stage with long blades	301	e di
Appendix 1. A. Computation of Geometric Series Coefficients B. Computation of Functions According to Given Geometric Series Coefficients	312	
Appendix 2. TaKTI Blade Cascade (See Ch. IX)	318	
Bibliography AVATLABLE: Library of Congress	337	
	C/pw/mas 2-29-60	

with about many state prompts to the property of the property	SKIY, A.M., kand.tekhn.nauk: Selecting the reactivity for to 7 no.2:31-33 F 160.		
	1. TSentral'nyy kotloturbinnyy (Turbines)	institut.	

80V/96-60-2-5/24

Candidate of Technical Sciences Zavadovskiy, A. М.

AUTHOR:

Selection of the Reaction of Turbine Stages

Teploenergetika, 1960, Nr 2, pp 31-33 (USSR) TITIE:

ABSTRACT: Previously, in designing turbine blading, including twisted blading, insufficient attention was paid to heat-drop distribution, and negative reaction was sometimes permitted in the blade roots. In present practice there is zero or slightly positive reaction at all blade roots when operating under design conditions; but it is still not certain whether the amount of reaction chosen is in Consider the fact the optimum and if so for what region. turbine blading illustrated diagrammatically in Fig la; if the degree of reaction is small, there will be little leakage through the peripheral gap 6, but there may be negative reaction at the root section attended by the usual undesirable consequences. If the stage reaction is increased, flow round the root part of the blades improves but leakage through the peripheral gap increases. for stages with short blades, corresponding to Fig la, Card 1/2 the optimum velocity ratio has a corresponding optimum

sov/96-60-2-5/24

selection of the Reaction of Turbine Stages

range of reaction. Stages made according to the diagram on Fig 1b have no by-pass ducts such as are provided by the rotor disc apertures in the first case. Hence all steam passing through the diaphragm glands mixes with the main flow, altering the blade root conditions. This may somewhat modify the requirements of the blade root reaction. In stages with a drum-rotor, as illustrated in Fig 16, a higher degree of reaction leads to greater peripheral leakages but the root leakages are reduced. The maximum stage efficiency with allowance for losses is given by expression (1). Suitable values of stage reaction may be calculated by expression (2); other formulae are given for calculating the reaction under various conditions. If the turbine flow path is made according to the diagram of Fig la, the influence of leakages on the stage efficiency may be evaluated from the curves of Fig 4 taken from the author's article in Teploenergetika, Nr 6, 1957. A numerical example of stage reaction calculation is then worked out. There are 4 figures and 6 Soviet references.

Tsentral'nyy kotloturbinnyy institut (Central Boiler ASSOCIATION:

Turbine Institute)

801/96-59-6-3/22

AUTHOR: Zavadovskiv, A.M. (Candidate of Technical Sciences) TITLE:

The Selection of Overlap in Turbine Stages (O vybore

perekryshi v turbinnykh stupenyakh)

PERIODICAL: Teploenergetika, 1959, Nr 6, pp 17-21 (USSR)

ABSTRACT: In turbine stages of the construction shown in Fig 1 the value of the end losses at the periphery depends on a number of factors, of which the most important are: the shape of the annular space (flow path) of the blading and the shape of the channels in the guide vanes; the length of the axial gap between the wheel shroud and the body of the diaphragm; the distance between the outlet edges of the guide vanes and the inlet edges of the blading; the value of the overlap, that is the amount by which the peripheral diameter of the blades exceeds that of the guide vanes; the axial overlap of the shroud; the angle of divergence of the flow beyond the guide vanes; and the values of the Reynolds and Mach numbers. Accordingly, the stage efficiency can be expressed by a relationship of the form of expression (1). This article considers the influence of stage geometry upon efficiency at sub-critical Mach numbers when the values of the

SOV/96-59-6-3/22

The Selection of Overlap in Turbine Stages

Reynolds number are greater than 1 x 105 and optimum velocity ratio is maintained. A previous article by the same author (Teploenergetika 1955 Nr 10) showed that leakage through the open axial gap increases as the gap length increases, and diminishes as the overlap increases. However, excessive overlap impairs the flow conditions at the ends of the working blades and also lowers the efficiency. The flow leaves the guide vanes at an angle to a plane perpendicular to the machine shaft:. the flow is twisted by interaction between the flows Also, from neighbouring channels. There is, therefore, a p ressure gradient along the blade radius and the flow expands more than it would in the absence of the twisting. Therefore, in a turbine stage, the amount of twisting of the flow beyond the guide vanes is the main factor that governs the angle of divergence of the active part of the flow before the runner. In selecting the amount of overlap it is necessary to ensure that, on the one hand, the leakage through the axial gap is as small as possible, and on the other hand, the flow conditions over the rim of the working blades at the peripheral diameter are

Card 2/4

The Selection of Overlap in Turbine Stages

favourable. An expression is then given for the stage efficiency in terms of the axial gap, the overlap and the twisting of the flow. Formulae are developed that show the influence of various factors on the degree of twisting of the flow. A description is then given of the stage geometry and operating conditions used in making tests. The stage characteristics and best conditions are tabulated. The test results are plotted in Fig 2 in the form of curves of efficiency as a function of the number K, which is the ratio of the overlap to the product of the twisting of the flow and the axial gap. Graphs 2a, 2b and 2c correspond respectively to data of the Central Boiler Turbine Institute, the Neva Works, Leningrad, and the Bryansk Institute of Transport Engineering. The results show that for stages of the type investigated overlap has a favourable influence when K is between 0.7 and 0.8. It is concluded that the number K may be used to assess the optimum combination of axial gap, overlap, and twisting in turbine stages of the type shown in Fig 1 whose d/2 ratio is greater than 10. A graph of the reduction of stage efficiency due to the combined

Card 3/4

SOV/96-59-6-3/22

The Selection of Overlap in Turbine Stages

influence of axial gap and overlap as function of K is given in Fig 3, which may be used to determine the conditions under which overlap is unfavourable. This graph should not be used for stages with glands over the shrouding on the working blades because in this case the influence of overlap on the aerodynamic characteristics is much less.

There are 3 figures, 1 table and 3 Soviet references.

ASSOCIATION: Tsentral'nyy kotloturbinnyy institut (Central Boiler Turbine Institute)

Card 4/4

SOV/96-59-2-3/18

AUTHORS:

Zavadovskiy, A.M., Candidate of Technical Sciences

Babenko, Eh.L., Engineer

TITIE:

A Method of Designing the Flow Parts of Steam and Gas Turbines (Metod proyektirovaniya protochnoy chasti

parovykh i gazovykh turbin)

PERIODICAL: Teploenergetika: 1959, Nr 2, pp 23-28 (USSR)

ABSTRACT:

It is not yet possible to calculate all the characteristics necessary for stage design and it is, therefore,
recommended to use the so-called model stage method.
An appropriate model stage is taken as the basis for
designing a group of stages or, in some cases, the
entire flow part of the turbine by making appropriate
changes in the dimensions of the initial stage. The
aerodynamic characteristics that are required of each
model stage are stated in Eq (1) to (8). In addition,
data should be available about the model stage from
which the flow properties of the designed stages can be
determined to a first approximation. It is important
to include the necessary strength calculations at an
early stage. The number of stages may be selected on
the basis of identical heat drop on all the stages

Card 1/4

SOV/96~59~2~3/18

A Method of Designing the Flow Parts of Steam and Gas Turbines

developed from a single model stage. The design of the flow part is developed by comparing different variants of change of diameters, heat drops and stage shapes subject to certain stated requirements. Eq (10) is derived for the isc-entropic heat drop on the stage with allowance for inlet velccity. The factors that govern the heat drop in the stage are easily seen from this formula. A design procedure is then recommended. The diameter and length of the last stage are determined from Eq (11) and the necessary approximate strength calculations are made. The number of stages is selected and a law of stage diameter ratio is taken. The various other characteristics that are required can then be determined. Finally the critical speed of the rotor is determined. Various other requirements that occur in the calculations are stated and finally a numerical example of a design is given. Typical blading performance curves that are required for the purpose of the calculations are given in Fig 1 and 2. The design of stages for variable operating conditions is then considered in a similar

Card 2/4

SOV/96-59-2-3/18

A Method of Designing the Flow Parts of Steam and Gas Turbines

way, using the same basic equations. If model stages corresponding to the given conditions of operation are not available the design must be based on the velocity triangle method. As it is not possible to calculate all the losses in the flow part when the velocity triangle method of design is used, it is necessary to make use of experimental data obtained during tests on blading mounted on turbine wheels. Then it is not necessary to design each stage of the turbine anew but in this case too, the same principles can be adopted as are used in the model stage method. Here again, the total heat drop in the turbine is divided into several parts, each corresponding to a group of similar stages. A single stage is then designed for each group and forms a basis for the design of the rest of the group. The general principles are the same as in the previous methods. The formula necessary for design by this method is then given and typical curves required in the calculations are also given in Fig 4, 5 and 6. Expression (17) is used to determine the efficiency of

Card 3/4

SOV/96--59--2--3/18

A Method of Designing the Flow Parts of Steam and Gas Turbines the elementary stage. Further steps in the design procedure are explained and finally a numerical example of design is given. There are 6 figures and 3 Soviet references.

ASSOCIATION: Tsentral'nyy Kotloturbinnyy Institut (Central Boiler Turbine Institute)

Card 4/4